

first and second terga, narrow apical bands on fourth, fifth and occasionally sixth terga, pair of small spots on first sternum, small spot beneath on fore femur, fore and mid tibiae except narrow black streak on outer surface, hind tibia beneath, fore tarsus and mid basitarsus.

Characters peculiar to the male are: head height 0.8 times the greatest width; eyes not convergent above or below, the interocular distance at posterior ocelli and intersection of epistomal suture and inner eye margin subequal; clypeus gently convex, the apical margin of median lobe feebly tridentate, the apical margin with a fimbria of curled, waxy-appearing hairs on lateral third; keel on lateral surface of pronotum produced into a lamella; sides of pygidium gently curved, the greatest width $\frac{2}{3}$ the length, the surface coarsely punctate, fifth and sixth sterna without subbasal fimbriae; and hypopygium semicircularly emarginate at apex, the lateral teeth acute and slender.

The male most closely resembles *Cerceris venusta atrescens* Krombein and runs to that taxon in my key (1969, p. 11). It is distinguished by the yellow bands or spots on the first 2 terga, the presence of a yellow band on the sixth tergum, and the lamellate development of the lower part of the pronotal keel. The allotype of *v. atrescens* from Mt. Hagen and paratype from Wau are properly referable to *vechti*, leaving the paratype from Kukur as the only known male of *v. atrescens*.

REFERENCES

- KROMBEIN, K. V. 1969. A revision of the Melanesian wasps of the genus *Cerceris* Latreille. *Smithson. Contrib. Zool.*, No. 22, 36 pp., 23 figs.

THE SPECIES OF THE GENUS *TACPARIA* WALKER (LEPIDOPTERA, GEOMETRIDAE)

DOUGLAS C. FERGUSON

Systematic Entomology Laboratory, Agricultural Research Service, USDA¹

ABSTRACT—The American genus *Tacparia* Walker, previously thought to consist of 2 species, is shown to include 3; namely, *zalissaria* Walker, *atropunctata* (Packard), and *detersata* (Guenée). The names *zalissaria* and *atropunctata*, which had been considered synonymous, actually refer to structurally distinct but superficially similar sibling species. Their distribution is limited mainly to the Atlantic coastal region, *atropunctata* being northern and *zalissaria* southern, with some overlap in the general vicinity of New York City.

Tacparia Walker

Tacparia Walker, 1860, p. 233. Type-species: *Tacparia zalissaria* Walker, 1860, by monotypy.

¹ Mail address: c/o U.S. National Museum, Washington, D.C. 20560.

Apaccasia Hulst, 1896, p. 340. Type-species: *Tephрина deterrenta* Guenée, 1857 = *Apaccasia deterrenta* (Guenée), designated by Hulst, 1896.

In his treatment of this genus, Rupert (1949) considered that there were only 2 species, *detersata* and *zalissaria*. Recent study of more material than was then available has revealed the existence of a third species, in appearance barely distinguishable from *zalissaria* but structurally well differentiated. The names *atropunctata* Packard and *fernaldi* Grote, relegated to the synonymy by Rupert upon his discovery of the older name, *zalissaria*, are available for this third species. *Tacparia zalissaria* and *atropunctata* are rare in collections and seem mainly restricted to the region of the Atlantic coastal plain and upper St. Lawrence Valley. Their distributions are mostly allopatric, *atropunctata* having a northern distribution from Nova Scotia and Ontario to New Jersey, and *zalissaria* occurring southward from Connecticut to Florida. Both are present in a narrow zone of overlap between southern Connecticut and southern New Jersey. *Tacparia deterrenta* (fig. 11, 12) occurs across southern Canada from Nova Scotia to Alberta and southward in the east to New Jersey and Pennsylvania, and is relatively well known. Its usual host plant is *Alnus rugosa* (DuRoi) Spreng. Rupert's diagnosis of *detersata* remains unchanged, the present discussion treating in detail only the two siblings that have been confused.

Tacparia zalissaria Walker

fig. 1, 2, 5-7, 13-15, 19

Tacparia zalissaria Walker, 1860, p. 234. Rupert, 1949, p. 150, in part. Kimball, 1965, p. 168.

Apicia ? deductaria Walker, 1860, p. 237.

Apaccasia deductaria, Dyar, 1902 [1903], p. 317, in part.

Apaccasia atropunctata form *darlingtoni* Lemmer, 1937, p. 23.

Apaccasia atropunctata, Barnes and McDunnough, 1917, p. 115, in part. McDunnough, 1938, p. 168, in part.

Lithina atropunctata, Forbes, 1948, p. 88, in part.

Diagnosis: Similar in size and basic pattern to *detersata* but differing slightly in wing shape, the apex of the forewing being more produced and pointed; general coloring much darker brown. Extremely similar to *atropunctata*, with which it has been confused, but slightly larger and dimorphic with light and dark forms. Female heavily dusted with blackish scales, unlike that of *atropunctata*. Genitalia distinctive in both sexes. Known mainly from the coastal plain from Connecticut to Florida.

Types: Before the publication of Rupert's paper (1949), the name *zalissaria* was overlooked in North America because the only localities mentioned by Walker were Australia and Sydney [Australia]. How-

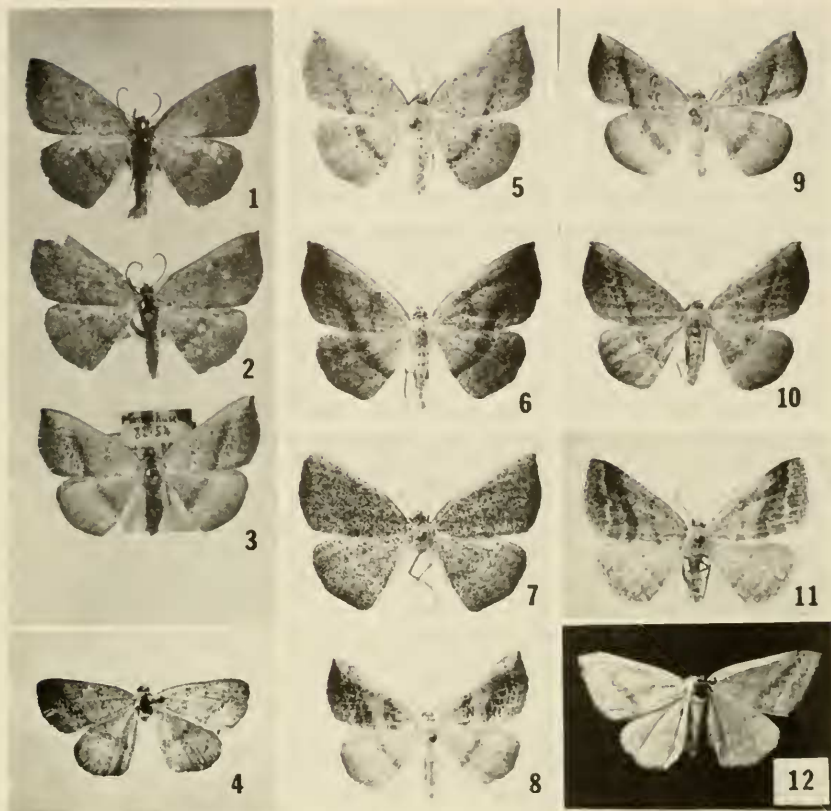


FIG. 1-12, *Tacparia* spp. 1, *zalissaria*, lectotype. 2, *zalissaria*, holotype of *Apicia* ? *deductaria*. 3, *atropunctata*, lectotype of *Drepanodes fernaldi*. 4, *atropunctata*, lectotype. 5, *zalissaria*, ♂, Arcadia Plantation, Georgetown, South Carolina, March 26, 1968, D. C. Ferguson. 6, *zalissaria*, ♂, University Conservation Reserve, Welaka, Putnam Co., Florida, March 11, 1962, D. C. Ferguson. 7, *zalissaria*, ♀, same locality and collector as for fig. 6, March 21, 1962. 8, *atropunctata*, ♂, Auburn, Kings Co., Nova Scotia, June 6, 1952, D. C. Ferguson. 9, *atropunctata*, ♂, Williams Lake, Purcell's Cove Road, Halifax Co., Nova Scotia, May 30, 1957, D. C. Ferguson. 10, *atropunctata*, ♀, Lake Kejimikujik, Queens Co., Nova Scotia, June 18, 1957, D. C. Ferguson. 11, *detersata*, ♀, Centreville, Kings Co., Nova Scotia, June 3, 1949, D. C. Ferguson. 12, *detersata*, holotype (in USNM).

ever, the type series of 4 specimens in the British Museum (Natural History) included 2 species, specimens a and b being said to equal the Australian *Idoides apicata* Guenée, and c and d, locality unknown, representing the American species now under discussion. One of the latter, the male specimen illustrated (fig. 1), was designated by Rupert

as the lectotype of *zalissaria* on the basis of this same photograph, which he had received from the British Museum (Natural History). As he did not publish this figure or any other clear indication of which specimen was intended, there could arise a question as to whether his action constituted a valid lectotype designation. To overcome this problem, I now redesignate as lectotype the specimen herein represented by figure 1, and it is being so labeled. The type locality of *zalissaria* remains unknown but is probably Georgia or Florida, the sources of most material that Walker described from the southeastern United States.

The type of *deductaria* is a male (monotype) in the British Museum (Natural History) (fig. 2). The source of this specimen was unknown to Walker, but again it probably came from Georgia or Florida.

The name *darlingtoni* was based on 2 specimens from New Lisbon, Burlington Co., New Jersey, a holotype male taken June 1, 1935, and an allotype female taken May 5, 1930. Both specimens were in the collection of Dr. Emlen P. Darlington, and are now in the collection of the Academy of Natural Sciences, Philadelphia.

Synonymy: I am confident, on the bases of the photographs and probable places of origin of the type material, that *zalissaria* and *deductaria* represent the same species, the southern one. I have not seen the types of *darlingtoni*, but the original description would seem to leave little doubt as to their identity. Lemmer regarded this as a melanic form of *atropunctata*, and although both species are present in New Jersey, only *zalissaria* is known to occur in a dark form. Without evidence of such variation in *atropunctata*, it seems safe to conclude that *darlingtoni* is the dark form of *zalissaria*.

Further description: Male antennae subcylindrical basally, becoming slightly compressed distally, finely and densely setose; female antennae about half as thick as those of male, filiform, also finely setose, the setae similar to those of the male. Male palpi moderate, exceeding front by $\frac{1}{4}$ their length, coarsely scaled, third segment small, rounded, usually somewhat decumbent and mostly concealed by scales of second; female palpi similar, a little more slender. Front of both sexes with scales in lower half elevated and protruding as a tuft almost as far as palpi. Eyes of male very large, reducing the front to a width slightly less than its height; eyes of female smaller, front at least as wide as high. Tongue of both sexes well developed. Legs normal, but hind tibiae of both sexes stouter than those of *detersata*, subcylindrical, not prismatic, hind tibiae of male more swollen than those of female. Wing shape as in *detersata* but with forewing more produced, resulting in slight concavity on outer margin between the pointed apex and vein M_3 .

Scales of antennae, head and palpi light brown, with a variable mosaic mixture of dark scales; thorax and abdomen similar but slightly paler, with paired, blackish, dorsal spots on mesothorax and abdominal segments 1 to 3. Legs light brown, variably dusted with dark brown scales, those on hind tibia tending to be concen-

trated in a blackish lateral patch near basal end (a character not seen in *detersata* or *atropunctata*).

With respect to wing coloring, the species occurs as 2 different forms: the one light violaceous gray-brown, much like *atropunctata*; the other much browner, often rather dark, unlike *atropunctata*. These are described separately as follows:

Gray form (fig. 5). Both wings relatively uniform gray-brown with a violet tint, sparsely dusted with blackish brown; antemedial of forewing indicated by 3 dark dots, of hindwing, wanting; postmedial indicated on both wings by regular series of small, dark brown vein dots, some of these bearing miniature white rays outwardly. Postmedial on both wings usually preceded by a diffuse, dusky brown shade that disappears before reaching costa. Discal spots dark, minute. Costa bright yellowish brown, thinly margined with this shade but contrasting, especially toward base, followed by a subcostal shade somewhat paler than the rest of the wing. Fringes concolorous with wing, whitish tipped, otherwise unmarked. Underside grayish, more heavily dusted with dark scales, postmedial vein dots stronger than above but antemedial wanting; no dark shade associated with postmedial; several small, dark marginal dots, especially toward apex of forewing.

Brown form (fig. 6). Similar in pattern to the grayish form but with the ground color tawny brown, variably suffused with dark brown. Dark shade preceding postmedials more extensive and diffuse, sometimes continuing as dark shading to the outer margin, leaving the median, basal and costal areas paler. Dark specimens ("*darlingtoni*") appear commonest, but light brown specimens also occur. Underside as in gray form.

The only female of *zalissaria* available for examination, a specimen from Welaka, Florida (fig. 7), resembles the gray form described above except that it is uniformly and densely dusted with blackish scales, and the shade preceding the postmedial is weak, not contrasting, and reddish or tawny, not dusky brown.

Length of forewing: male, 15 to 17 mm; average male (of 16), 15.7 mm; female, 17 mm.

Male genitalia (fig. 13-15). Each valve with a long, slender, clavate, basal costal process, tipped with stout bristles, and with a second long, slender, curved process arising laterally near the sacculus and projecting through a median basal opening in the valve. Gnathos angulate, recurved. Transtilla large, bilobate. Juxta with 1 pair of stout processes, each terminating in a cluster of spines. Aedoeagus containing a long series of large cornuti, some of which may be lost in copulation as suggested by the specimens illustrated. *Zalissaria* differs greatly from *atropunctata* in all of the above features.

Female genitalia (fig. 19). Very peculiar and so extremely different from those of *atropunctata* that one would hardly suppose them to be closely related on this basis alone. Slender portion of bursa copulatrix, supposedly the ductus bursae, entirely sclerotized and rugose; corpus bursae similarly thickened and semi-rigid, and with its interior surface densely covered with bristlelike spicules, arranged in concentric circles about a large, heavily sclerotized, invaginated signum. *Atropunctata* has a more slender and membranous bursa copulatrix, with the spicules present as rudiments only on its finely scobinate interior surface.

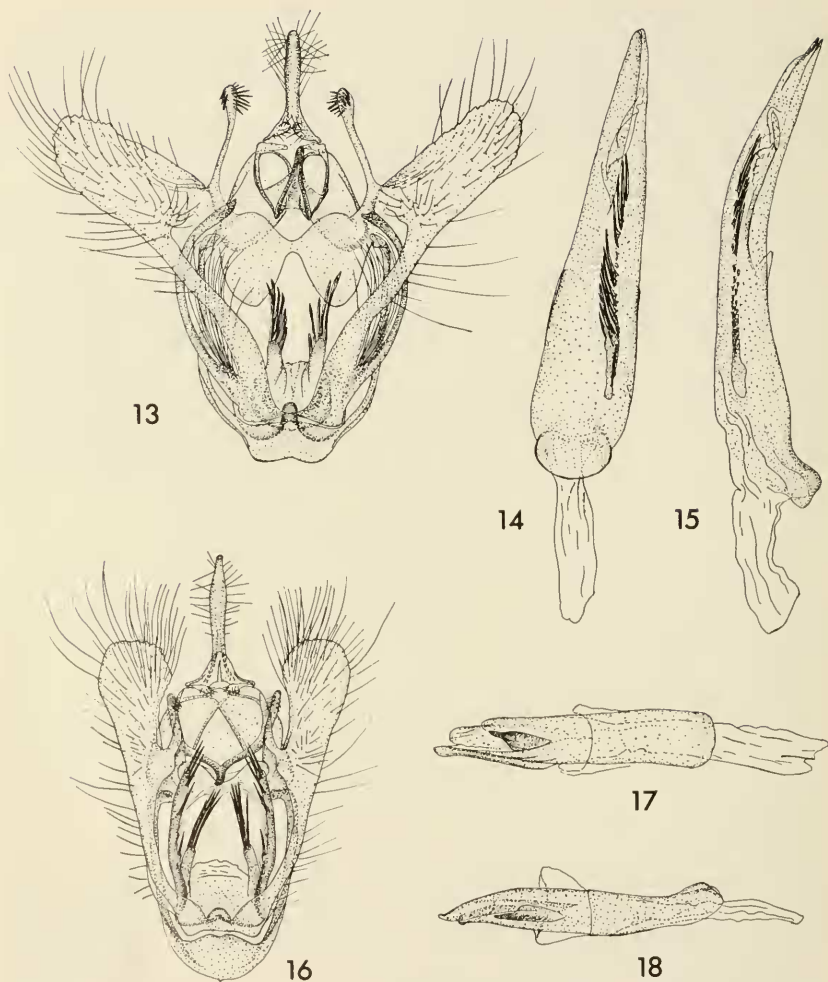


FIG. 13-18, *Tacparia* spp. 13, *zalissaria*, ♂ genitalia, Welaka, Putnam Co., Florida. 14, aedeagus of same specimen, ventral view. 15, aedeagus of another ♂ of *zalissaria*, also from Welaka, Florida, lateral view. Many of the deciduous cornuti have been lost in this example. 16, *atropunctata*, ♂ genitalia. Auburn, Kings Co., Nova Scotia. 17, aedeagus of same specimen, ventral view. 18, aedeagus of another ♂ of *atropunctata* from Mount Uniacke, Hants Co., Nova Scotia, lateral view.

The form of the signum, ostium, and sterigma also differs conspicuously in the 2 species.

Material examined: 28 males, 1 female; 3 male, 1 female genitalia slides.

Distribution: FLORIDA: Vero Beach [Indian River Co.]; Oneco, Manatee Co.; Archbold Biological Station, Lake Placid, Highlands Co.; University of Florida Conservation Reserve, Welaka, Putnam Co. Also reported by Kimball (1965, p. 186) from Escambia Co., Myrtle Grove, Quincy, and Siesta Key (not examined). SOUTH CAROLINA: Wedge Plantation, McClellanville, Charleston Co.; Arcadia Plantation, Georgetown, Georgetown Co. NEW JERSEY: Lakehurst, Ocean Co.; Freehold [Monmouth Co.]; New Lisbon, Burlington Co. (types of *darlingtoni*—not examined). NEW YORK: Yonkers, Westchester Co.; Valley Cottage, Rockland Co. CONNECTICUT: Bethany, New Haven Co.

Geographical variation: None apparent.

Flight period: In Florida, March 9 to April 4; in South Carolina, March 26 to May 8; New Jersey and New York, May 5 to June 3; the single Connecticut record taken May 19, 1968. Apparently 1 generation.

Early stages: Unknown. On the basis of what is known of *atropunctata*, bayberry and wax myrtle should be tried as host plants. Forbes (1948, p. 89, under *atropunctata*) states "Larva on birch (Lemmer)," but I have not found the source of this information.

Tacparia atropunctata (Packard)

fig. 3, 4, 8-10, 16-18, 20

Lozogramma atropunctata Packard, 1874, p. 50; 1876, p. 244, pl. 9, fig. 58.

Apaeccasia deductaria, Dyar, 1902 [1903], p. 317, in part.

Apaeccasia atropunctata, Barnes & McDunnough, 1917, p. 115, in part. McDunnough, 1938, p. 168, in part.

Lithina atropunctata, Forbes, 1948, p. 88, in part.

Tacparia zalissaria, Rupert, 1949, p. 150, in part. Ferguson, 1954, p. 319.

Drepanodes femaldi Grote, 1878, p. 17.

Diagnosis: Extremely similar to *zalissaria* in appearance but with certain subtle differences in pattern and coloring pointed out in the description, and with very different genitalia in both sexes. Also, *atropunctata* has an exclusively northeastern distribution from Nova Scotia, southern Quebec and southern Ontario to New Jersey and Pennsylvania, only slightly overlapping that of *zalissaria*.

Types: *Tacparia atropunctata* was described from 1 male and 2 females from Boston, Beverly and Salem, Massachusetts. The only type that can now be found is a male, without abdomen, in the Museum of Comparative Zoology, Harvard University (fig. 4), and I hereby designate this example as the lectotype. It is labeled as follows: "Massachusetts, Packard Coll.," "A.S. Packard Type," "Type 14620," "*Lozogramma atropunctata* Pack. Type," and "LECTOTYPE *Lozogramma atropunctata* Pack., By D. Ferguson, '73." The lectotype clearly rep-

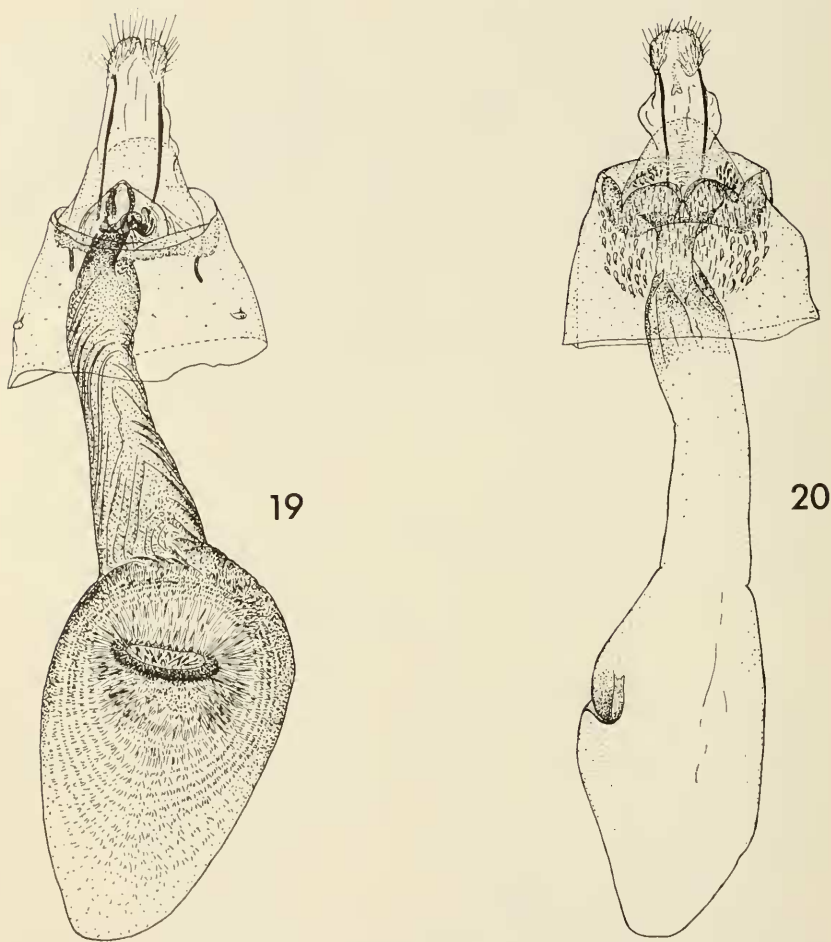


FIG. 19, 20, female genitalia. 19, *Tacparia zalissaria*, Welaka, Putnam Co., Florida. 20, *atropunctata*, Bog E of Big Indian Lake, Halifax Watershed Area, Halifax Co., Nova Scotia.

resents the northern species. *Drepanodes fernaldi* was described from 2 females collected at Newtonville, Massachusetts, on June 16, 1877 by Roland Thaxter. I hereby designate as the lectotype of *fernaldi* the specimen figured (fig. 3), which is in the British Museum (Natural History).

Synonymy: Identification of *fernaldi*, the only synonym of *atropunctata*, is based on a photograph (fig. 3) of 1 of the 2 original types,

as well as knowledge of the type locality which I believe to be north of the range of *zalissaria*. This photograph shows the smaller size and relatively contrasting pattern characteristic of *atropunctata*, especially the dark submarginal shade on both wings in addition to the contrasting shade preceding the postmedial lines.

Further description: Antennae of both sexes as in *zalissaria* but slightly more slender. Structural detail of palpi, front, eyes, tongue, legs, and wing shape apparently the same as in *zalissaria* except that the female front looks narrower.

Coloring of front and palpi as in *zalissaria* but with few or no intermixed dark scales; legs and underside of body less heavily dusted with dark brown scales and lacking the concentrated blackish lateral patch near basal end of each hind tibia that is characteristic of *zalissaria*. Coloring of legs and body otherwise alike in the 2 species.

Although somewhat variable in the extent and intensity of the dark antemedial and postmedial bands, this species does not have the polymorphism of *zalissaria*. It occurs rather uniformly in a coloring only slightly browner than what I described as the gray form of *zalissaria*. Scales of body, wings and fringes, under magnification, appear more lustrous than those of *zalissaria*.

Upperside of both wings light brown, varying from reddish to grayish, commonly with a distinct violaceous tint, less obviously dusted with dark scales than *zalissaria*; costa not yellowish or but faintly so, never the contrasting yellow-brown shade of *zalissaria*; antemedial and postmedial lines of forewing sometimes apparent as blue-gray, weakly crenulate lines, incorporating the same though less obvious series of venular dots found in *zalissaria*; antemedial of hindwing wanting; postmedial of both wings preceded by a reddish-brown shade, forming an almost straight, oblique band from inner margin to costa on each wing; in most males, but not females, forewing with a diffuse, dark gray-brown shade preceding or suffusing the antemedial, and a corresponding shade bordering the postmedial outwardly, thus enclosing (and obscuring) the postmedial between inner reddish-brown and outer grayish to blackish-brown shades. Outer third of forewing often darker than median space, commonly pale inwardly, darkening toward outer margin; hindwing also slightly darker toward outer margin. Discal spot of forewing weak, blackish; of hindwing, usually wanting. Fringes concolorous with wings, whitish tipped, otherwise unmarked. Underside of wings dusted with reddish brown on a pale ground, often with a bluish tint, less coarsely speckled with dark scales than *zalissaria*, and with series of vein dots representing postmedial lines much less distinct. Discal spots beneath also less distinct than in *zalissaria*; marginal dots wanting.

Tacparia zalissaria differs in lacking the blackish scaling before the antemedial and after the postmedial commonly present in *atropunctata*, but the shade preceding the postmedial may be much darker and more diffuse in *zalissaria*, producing a somewhat similar effect with different components of the pattern.

Length of forewing: male, 13 to 14.5 mm; average male (of 24), 13.8 mm; female, 14.5 to 15.5 mm; average female (of 7), 15 mm.

Male genitalia: (fig. 16-18). Differing from those of *zalissaria* in several conspicuous features. Basal costal process of valve much shorter and arising nearer base of costa; valve differently shaped, with costa concave; long process arising from outer face of sacculus in *zalissaria* not present in the same position, but

probably homologous to the larger of the 2 pairs of processes that appear to arise from the juxta; inner pair of juxtal processes somewhat similar to those of *zalisaria*; outer pair more than twice length of inner pair, bearing 5 or 6 long spines; transtilla smaller, differently shaped; gnathos a simple ring with a small tooth; aedeagus with 1 large tooth on the vesica, not a long cluster of deciduous cornuti as in *zalissaria*.

Female genitalia: (fig. 20) Much less sclerotized than those of *zalissaria*. Bursa copulatrix almost entirely membranous and of a more slender shape; sclerotized structures of the integument associated with the ostium (the sterigma) very different in form, and surface of integument surrounding this area bearing scales strongly resistant to removal; a portion of interior surface of corpus bursae minutely scobinate but not heavily spiculate as in *zalissaria*; signum a simple, transverse, sclerotized, invaginated fold in wall of corpus bursae, on left side.

Material examined: 53 males, 18 females; 2 male, 2 female genitalia slides; 1 brood of larvae reared.

Distribution: NEW JERSEY: Lake Hopatcong; Lakehurst, Ocean Co. PENNSYLVANIA: Luzern Co. NEW YORK: Ithaca, Tompkins Co. MASSACHUSETTS: Boston, Beverly and Salem (types of *atropunctata*). CONNECTICUT: Beckley Bog, near Norfolk, Litchfield Co. MAINE: Biddeford. NOVA SCOTIA: Armdale, Halifax Co.; Williams Lake, Purcell's Cove Road, Halifax Co.; Bog E of Big Indian Lake, Halifax Watershed area, Halifax Co.; West Dover, Halifax Co.; Port Wallis, Halifax Co.; MacNab's Island, Halifax Co.; Mount Uniacke, Hants Co.; Coldbrook, Kings Co.; Aldershot, Kings Co.; Auburn, Kings Co.; Lake Kejimkujik, Queens Co.; Round Hill, Annapolis Co.; South Milford, Annapolis Co.; Annapolis Royal, Annapolis Co.; Digby, Digby Co.; Argyle, Yarmouth Co. NEW BRUNSWICK: Eel River. QUEBEC: Lac Mondor; Lac Connelly; Kazubazua. ONTARIO: Biscotasing; Marmora.

Geographical variation: None.

Flight period: Flies in late spring to early summer with only 1 generation—May 25 to July 9. Peak flight period in first half of June in most areas, showing little geographical variation in time of emergence; earliest and latest dates given are for Nova Scotia, the source of most material; June 11 and 15 in New Jersey; May 29 and 31 in New York; June 21 in Connecticut; May 26 to June 28 in Quebec and Ontario.

Early stages: Larvae that I reared on *Myrica Gale* L. at Armdale, Nova Scotia in 1948 were studied by Rupert (1949, p. 150, as *zalisaria*), who found them almost identical to those of *detersata* except that they were green instead of light brown. The pattern consisted of the same brown longitudinal lines. These larvae were offered alder and birch, which they refused, but fed readily on *Myrica Gale*. No other species of Myricaceae were tried, but the next year, on June 5, 1949, I flushed a number of fresh adults from a large patch of sweet fern (*Myrica asplenifolia* L.) at Coldbrook, Nova Scotia, under circumstances that led me to conclude that this plant also served as a host.

SUMMARY

Checklist arrangement of the species of *Tacparia* would be as follows (synonyms in italics):

Tacparia Walker

1. *zalissaria* Walker
deductaria (Walker)
darlingtoni (Lemmer)
2. *atropunctata* (Packard)
fernaldi (Grote)
3. *detersata* (Guenée)

ACKNOWLEDGMENTS

The photographs of the types in the British Museum (Natural History), which I reproduced, were kindly sent to me by Mr. Laurence R. Rupert of Sardinia, N. Y., and this has made possible the correct association of the names *zalissaria*, *deductaria* and *fernaldi*. I am also indebted to Dr. Frederick H. Rindge of the American Museum of Natural History, Dr. John G. Franclemont of Cornell University, Dr. John Burns, Museum of Comparative Zoology, Harvard University and Dr. W. C. McGuffin of the Entomology Research Institute, Ottawa, Ontario, for the privilege of examining specimens. Also studied was the material in the U.S. National Museum, to which have now been added the specimens of *Tacparia* from my own collection.

REFERENCES

- Barnes, William, and James H. McDunnough. 1917. Check List of the Lepidoptera of Boreal America. Herald Press, Decatur, Illinois. 392 p.
- Dyar, Harrison G. "1902" [1903]. A List of North American Lepidoptera and Key to the Literature of this Order of Insects. Bull. U.S. National Museum 52.
- Ferguson, Douglas C. 1954. The Lepidoptera of Nova Scotia, pt. 1, Macrolepidoptera. Proc. N.S. Inst. Sci. 23:161-375, illus.
- Forbes, William T. M. 1948. Lepidoptera of New York and Neighboring States, pt. 2. Cornell Univ. Agr. Exp. Sta. Memoir 274:263 p., illus.
- Grote, Augustus Radcliffe. 1878. Description of a New Drepanodes. Can. Entomol. 10:17.
- Guenée, M. Achille. 1857. Uranides et Phalénites, pt. 2, being vol. 10 of Boisduval and Guenée, Histoire Naturelle des Insectes, Species Général des Lépidoptères. Collection des Suites à Buffon, Paris. pp. 1-584.
- Hulst, George D. 1896. Classification of the Geometrina of North America with descriptions of new genera and species. Trans. Amer. Entomol. Soc. 23:245-386.
- Kimball, Charles P. 1965. Lepidoptera of Florida. Arthropods of Florida and Neighboring Land Areas, vol. 1, 363 p., illus. Div. of Plant Industry, Florida Dept. Agric., Gainesville.
- Lemmer, Frederick. 1937. New Lepidoptera from the New Jersey Pine Barrens. Bull. Brooklyn Ent. Soc. 32:22-25.

- McDunnough, James H. 1938. Check List of the Lepidoptera of Canada and the United States of America, pt. 1, Macrolepidoptera. So. Calif. Acad. Sci. Memoir 1, 272 p.
- Packard, Alpheus Spring. 1874. Descriptions of New North American Phalaenidae. Sixth Report Peabody Acad. Sci., pp. 39-53.
- . 1876. A Monograph of the Geometrid Moths or Phalaenidae of the United States. Vol. 10 in F. V. Hayden, Report U.S. Geol. Surv. Territories. Govt. Printing Office, Washington. 607 p., illus.
- Rupert, Laurence R. 1949. Notes on the Group of Genera including *Lozogramma* Stephens and its Allies. Proc. Ent. Soc. Washington 51:137-151.
- Walker, Francis. 1860. List of the Specimens of Lepidopterous Insects in the Collection of the British Museum, pt. 20—Geometrites: p. 1-276.

OVARIOLE NUMBER IN PASSALIDAE (COLEOPTERA)¹

P. REYES-CASTILLO

Departamento de Zoología, Escuela Nacional de Ciencias Biológicas,
I.P.N., Mexico 17, D. F.

P. O. RITCHER

Department of Entomology, Oregon State University, Corvallis, Oregon 97331

ABSTRACT—Female Passalidae of 12 species, belonging to 8 genera, were found to have 2 ovarioles on each side.

In 1961, Robertson published a survey of ovariole numbers in Coleoptera. It included information on 329 species in 45 beetle families but only 1 species of Passalidae was mentioned. This species, listed as *Popilius disjunctus* (Ill.), was assigned to the genus *Odontotaenius* by Reyes-Castillo in 1970.

The writers recently dissected adults of 10 other passalid species from North America and 1 species from Australia, all of which were preserved in 70% ethanol or other fluids. We found the same 2-2 ovarian tubule number in the females as reported previously for *Odontotaenius disjunctus* (Table 1).

The Passalidae belong to the Scarabaeoidea, a superfamily which also includes the Lucanidae and Scarabaeidae. In contrast to the 2-2 ovariole condition in Passalidae, many Scarabaeidae have a 6-6 formula. In the Scarabaeinae, however, there is a reduction to 0-1 (Robertson, 1961) which is thought to be associated with nidification

¹This investigation was supported in part by grant GS-31129 from the National Science Foundation. Oregon Agricultural Experiment Station, Technical Paper No. 3677.